REMARKS

In response to the Office Action mailed September 16, 2009, Applicant respectfully requests reconsideration. To further the prosecution of this application, amendments have been made in the claims, and each of the rejections set forth in the Office Action has been carefully considered and is addressed below. The claims as presented are believed to be in condition for allowance.

Claims 2-4, 6-10, 12-14 and 16-20 were previously pending in this application. Claims 2, 8, 12 and 18 are amended. No claims are added or canceled. As a result, claims 2-4, 6-10, 12-14 and 16-20 remain pending for examination, with claims 2 and 12 being independent. No new matter has been added.

Claim Rejections Under 35 U.S.C. §103

Independent claim 2 stands rejected under 35 U.S.C. §103(a) as purportedly being obvious over U.S. Patent No. 5,614,687 to Yamada, et al. ("Yamada") in view of U.S. Patent No. 6,518,492 to Herberger, et al. ("Herberger"). Independent claim 12 is rejected under 35 U.S.C. §103(a) as purportedly being obvious over Yamada in view of Herberger and further in view of U.S. Patent No. 6,140,565 to Yamauchi, et al. ("Yamauchi"). As presented herein, each of claims 2 and 12 patentably distinguishes over any combination of the asserted references.

A.   Brief Overview Of Embodiments Of The Invention

Applicant's specification discloses that conventional techniques for determining a tempo of sound involve: (1) acquiring audio data in a musical composition as time-series data, (2) calculating an auto-correlation of the audio data to detect peak positions in the audio data and acquire candidates for a tempo, and (3) analyzing the beat structure of the musical composition on the basis of the peak positions in the autocorrelation pattern and levels of the peaks to estimate the tempo of the musical composition (pp. 1-2). Determining an auto-correlation of audio data and analyzing beat structure involves numerous complicated computational operations (p. 2). As a result, many stereo systems (e.g., in-vehicle car stereo or home audio systems) are ill-equipped for performing

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these operations, as the load on the central processing unit (CPU) is too great (p. 2). Accordingly, some embodiments of the invention provide a technique whereby the tempo of an input sound signal, such as a musical composition, may be determined simply and accurately without performing the auto-correlation and beat structure analysis that places such a large processing load on the stereo's CPU (p. 3).

The foregoing overview is provided to assist the Examiner in appreciating some aspects of the invention. However, this overview may not apply to each independent claim, and the language of each independent claim may differ in material respects from the overview above. Therefore, Applicant respectfully requests that careful consideration be given to the language of each independent claim, and that each be addressed on its own merits, without relying on the overview above. In this respect, Applicant does not rely on the overview above to distinguish any of the claims over the prior art, but rather relies only upon the claim language and the arguments presented below.

B.   Independent Claim 2

As amended, independent claim 2 recites a tempo analyzing apparatus comprising, *inter alia*, a peak detecting means for detecting positions of a plurality of ones, higher than a predetermined threshold, of peaks of change in level of an input sound signal; a time interval detecting means for detecting a time interval between peak positions detected by the peak detecting means in a predetermined unit-time interval; an interval frequency detecting means for identifying a frequently occurring one of the time intervals detected by the time interval detecting means; and an identifying means for accumulating a frequency of occurrence of each time interval between the positions of peaks detected in a plurality of unit-time intervals and identifying a tempo of sound to be reproduced with the sound signal on a basis of a maximum one among all the accumulated frequencies of time interval occurrence. A display controlling means is for causing an image to be displayed on an image display device corresponding to the tempo identified by the identifying means, and not to a tempo identified using any auto-correlation calculation or beat structure analysis.

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In Applicant's previous response (filed May 26, 2009), it was pointed out that none of the asserted references discloses or suggests identifying a tempo of a sound to be reproduced with a sound signal in a manner which is not based on any auto-correlation calculation or beat structure analysis. In the "Response To Arguments" section, the Office Action indicates disagreement with this point, and points to a passage of Herberger (i.e., at col. 7, line 47–col. 8, line 3) as purportedly disclosing identifying a tempo of sound on the basis of a maximum one among all accumulated frequencies of time interval occurrences, which the Office Action contends does not require any auto-correlation calculation or beat structure analysis (Office Action, p. 7).

Applicant respectfully traverses this contention. In the cited passage, Herberger discloses a technique whereby a histogram is generated of the magnitudes of observed inter-beat intervals from a musical segment (col. 7, lines 51-53). The histogram indicates inter-beat time intervals which are observed more frequently than others (col. 8, lines 8-11). Herberger explicitly discloses, however, that histogram generation produces only a "rough approximation" of a tempo for a sound signal, "does not generally produce very accurate [tempo identification] estimates, and is heavily dependent on the nature of the musical work" (col. 8, lines 23-25). Because of the problems associated with identifying which of the many possible tempo candidates corresponds to the actual tempo of a musical work from this "rough approximation," Herberger discloses that "the instant invention" then supplements the rough approximation using other techniques (col. 8, lines 29-38). One such technique is "envelope analysis," which involves examining multiple aspects of a sound signal, including identifying a "sharply inclined phase" often indicative of the initial part of beat (i.e., the attack) or a change in the overall amplitude of the music, which Herberger discloses can be used to differentiate between a general increase in volume and a "true beat" (col. 6, lines 22-25 and 35-43).

The envelope analysis disclosed by Herberger is precisely the type of processing-intensive beat structure analysis which Applicant's specification discloses many stereo systems, such as in-vehicle car stereo and home audio systems are ill-equipped to perform (Applicant's specification, p. 2). As such, Herberger does not satisfy the limitation recited by former claim 2 directed to an identification of a tempo of sound to be reproduced with a sound signal which is not on a basis of any auto-correlation calculation or beat structure analysis, as the Office Action contends. On the

contrary, Herberger explicitly discloses that complex beat structure analysis is needed to supplement the approximation technique disclosed in the passage cited by the Office Action.

Despite this distinction over the prior art of record, claim 2 is amended herein to recite a display controlling means for causing an image that does not correspond to a tempo identified using any auto-correlation calculation or beat structure analysis to be displayed on an image display device. Not only does Herberger not disclose or suggest a display controlling means for causing an image corresponding to a tempo so identified to be displayed on an image display device, but in fact Herberger explicitly teaches away from such a display controlling means. Specifically, as noted above, Herberger explicitly states that the histogram generation technique disclosed in the passage relied upon by the Office Action produces only a rough approximation of a tempo for a sound signal, does not generally produce very accurate estimates, is heavily dependent on the nature of the musical work, and must be supplemented using other techniques (col. 8, lines 23-25 and 29-38). By disparaging the results of histogram generation and stating that it must be supplemented with processing-intensive beat structure analysis, Herberger clearly indicates that an image corresponding to a tempo identified not using any auto-correlation calculation or beat structure analysis is unsuitable for display on an image display device.

Yamada fails to remedy this deficiency of Herberger, as Yamada says nothing at all regarding a display controlling means for causing an image corresponding to a tempo not identified using any auto-correlation calculation or beat structure analysis to be displayed on an image display device. Indeed, Yamada says nothing at all regarding identifying a tempo of sound to be reproduced with a sound signal not on a basis of any auto-correlation calculation or beat structure analysis, and so Yamada necessarily does not disclose or suggest a display controlling means for causing an image corresponding to a tempo so identified to be displayed on an image display device.

Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 2 under 35 U.S.C. §103(a) as purportedly being obvious over Yamada in view of Herberger.

Claims 3-4 and 6-10 depend from claim 2 and are patentable for at least the same reasons.

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C.   Independent Claim 12

As amended, claim 12 recites a tempo analyzing method comprising, *inter alia*, detecting positions of a plurality of ones, higher than a predetermined threshold, of peaks of change in level of an input sound signal; detecting a time interval between the detected peak positions in a predetermined unit-time interval; identifying a frequently occurring one of the detected time intervals; accumulating a frequency of occurrence of each time interval between the peak positions detected in a plurality of the unit-time intervals; identifying the tempo of the sound to be reproduced on a basis of a maximum one among all the accumulated frequencies of time interval occurrence; and displaying an image on an image display device corresponding to the identified tempo and not to a tempo identified using any autocorrelation calculation or beat structure analysis.

It should be appreciated from the discussion above relating to claim 2 that neither Herberger nor Yamada discloses or suggests displaying an image on an image display device corresponding to a tempo identified not using any autocorrelation calculation or beat structure analysis, as recited by amended claim 12.

Yamauchi fails to remedy this deficiency of Herberger and Yamada. Yamauchi says nothing about a tempo identified not using any autocorrelation calculation or beat structure analysis, and so Yamauchi necessarily fails to disclose or suggest displaying an image on an image display device corresponding to a tempo so identified, as recited by claim 12.

As a result, claim 12 patentably distinguishes over any combination of the asserted references, such that the rejection of claim 12 under 35 U.S.C. §103(a) as purportedly being obvious over Yamada in view of Herberger and Yamauchi should be withdrawn.

Claims 13-14 and 16-20 depend from claim 12 and are allowable for at least the same reasons.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. S1459.70086US00.

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Respectfully submitted,

By _Randy J. Pritzker_

Randy J. Pritzker
Registration No.: 35,986
WOLF, GREENFIELD & SACKS, P.C.
Federal Reserve Plaza
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
617.646.8000

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